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Rudolf Carnap and David Lewis on Metaphysics: A Question of Historical Ancestry

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In an unpublished speech from 1991, David Lewis told his audience that he counted 'the metaphysician Carnap (not to be confused with the anti-metaphysician Carnap, who is better known)' amongst his historical ancestors. Here I provide a novel interpretation of the *Aufbau* that allows us to make sense of Lewis's claim. Drawing upon Lewis's correspondence, I argue it was the Carnap of the *Aufbau* whom Lewis read as a metaphysician, because Carnap's appeal to the notion of founded relations in the *Aufbau* echoes Lewis's own appeal to the metaphysics of natural properties. I further maintain that Lewis was right to read Carnap this way and that the notion of a founded relation has a legitimate claim to be both logical and metaphysical. I also argue that Carnap's initial response to Goodman's puzzle about 'grue' relies upon a metaphysics of simple properties which also prefigures Lewis's own response to Goodman invoking natural properties.

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1. Introduction

It's Carnap who has perhaps the strongest and the best-known claim to being the great anti-metaphysician of analytic philosophy. David Lewis is the philosopher so often credited with responsibility for the late 20th century revival of metaphysics in the analytic tradition as the influence of Carnap and other logical positivists waned.[1] In light of Carnap's landmark anti-metaphysical contributions to the development of analytic philosophy, it's a remarkable fact that Lewis conceived his own metaphysics as lying in a line of a descent from *Carnap's* metaphysics. Lewis didn't make this claim in any of his published writings but he pays credit to Carnap in just such terms in his acceptance speech for the Behrman Prize, delivered in May 1991, which was left by Lewis amongst his papers upon his death in 2001.[2] Reflecting upon his own intellectual heritage, Lewis told his audience,

> I suppose my historical ancestors are above all, Leibniz and Hume (unless certain revisionists are right about Hume's teachings, in

[1]See, for example, Moore (2012, 329–30) and Simons (2013, 722–23).

[2]Lewis's acceptance speech is now to be found in the archive of his papers housed in the Firestone Library, Princeton. It will appear in a volume of Lewis's posthumous writings to be published by Oxford University Press, edited by Janssen-Lauret and MacBride (Lewis forthcoming). The Lewis correspondence from which I quote here is also to be found in the Firestone Library. I am grateful to Stephanie Lewis for permission to quote from Lewis's *Nachlass*.

which case my real ancestors are the inventors of a fictitious Hume). And more recently Mill, Ramsey, the metaphysician Carnap (not to be confused with the anti-metaphysician Carnap, who is better known), and Quine.

Anti-metaphysics is a recurrent theme in Carnap's writings but two works can be singled out for their influence (or notoriety). In 'Überwindung der Metaphysik durch logische Analyse der Sprache' (1932) Carnap famously argued that the so-called statements of traditional metaphysics, *i.e.*, statements which purport to be about the essence of empirically transcendent entities, are strictly meaningless. They are merely 'pseudo-statements', because, he argued, metaphysicians can neither specify the logical syntax of their technical terms nor provide an empirical criterion of application for them. But Carnap's anti-metaphysics evolved from a self-styled 'overcoming' of metaphysics to a kind of irenic deflationism. In 'Empiricism, Semantics, and Ontology' (1950a) he argued that there are no genuinely theoretical questions to be raised about the reality of things themselves as metaphysicians claim, but only, on the one hand, 'internal' questions which are relative to the rules of a language we have adopted, and, on the other hand, 'external' questions about which language and which set of rules it is practically expedient for us to adopt.

Take the spatio-temporally ordered system of observable things and events. According to 'Empiricism, Semantics, and Ontology', the 'thing' language or framework which we use to describe this system provides rules for answering 'internal' questions about things belonging to this system, whether, for example, King Arthur is real or merely imaginary. We recognise something as real in this sense if we can empirically establish that it occupies 'a particular space-time position so that it fits together with the other things recognised as real, according to the rules of the system'. So, Carnap judged, 'The concept of reality occurring in these internal questions' is a scientifically respectable 'non-metaphysical concept' (1950a, 22). By contrast,

'external' questions about 'the reality of the thing world itself', cannot be answered in scientifically respectable terms because such questions ask after the reality of an entire system rather than something belonging to a system. Carnap's proposal in 'Empiricism, Semantics, and Ontology' was that these questions, despite superficial grammatical appearances, aren't theoretical at all, 'Those who raise the question of the reality of the thing world itself have perhaps in mind not a theoretical question as their formulation seems to suggest, but rather a practical question, a matter of a practical decision concerning the structure of our language' (1950a, 23). So Carnap's 'anti-metaphysical' strategy was to marshall traditional questions of metaphysics into either (1) internal questions which have scientific answers, (2) external questions about the practical expediency of the language we employ, or (3), if they fail to be either internal or external, to dismiss them because they fail to be genuine questions altogether.[3]

By contrast, Lewis did take questions about the reality of things themselves and systems of them, *i.e.*, questions that were metaphysical in Carnap's sense, to be intelligible and genuinely theoretical rather than practical but not because such questions have been mistaken for scientific questions either. Witness Lewis's repeatedly avowed commitment to 'the traditional realism that recognises objective sameness and difference, joints in the world, discriminatory classifications not of our making', a commitment to a system of 'natural' properties which will play a central role in our discussion (1984, 228). Set against the back drop of Carnap's anti-metaphysical writings, Lewis's claim that Carnap was a metaphysician who inspired his own robustly metaphysical scheme appears extraordinary and unlikely.

In his acceptance speech for the Behrman Prize, Lewis also mentions 'certain revisionists . . . about Hume's teachings'. The revisionists that Lewis had in mind argue for an interpretation of Hume (the 'New Hume') whereby he never adopted a regularity theory of causation even though that is what Hume is famous for providing. Lewis remained agnostic upon this question of Hume scholarship, writing to Galen Strawson, a leading revisionist, that, 'So long as the experts are divided, I am not entitled to an opinion. I am not enough of an historian to judge the question for myself' (Lewis to Strawson, 23 June 1997).[4] Nonetheless, despite the scholarly diffidence on display in both his acceptance speech and his correspondence, Lewis felt able to authoritatively maintain that there is a 'metaphysician Carnap (not to be confused with the anti-metaphysician Carnap, who is better known)'. But who is this lesser known Carnap? Where does he reveal himself?

Because Lewis is very clear that Carnap did make a contribution to metaphysics, it's plausible to assume that Lewis had strong grounds for so interpreting him. But Lewis doesn't say in his speech or his published writings where to find this contribution and it's not at all obvious where to look in Carnap's writings since anti-metaphysics was a recurrent theme for Carnap. Hence some detective work is in order. A thorough examination of the rest of Lewis's *Nachlass* reveals part of the answer to where to find metaphysican Carnap: a letter to Philip Bricker in which Lewis

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[3]For close examination of 'Empiricism, Semantics, and Ontology', see Haack (1976) and Bird (1995, 2003). Carnap's distinction between 'internal' and 'external' questions has recently been subjected to critical scrutiny from Eklund (2009, 2013, 2016). For a response on behalf of the historical Carnap, see Creath (2016). Carnap's anti-metaphysics is also critically discussed in Moore (2012, 279–301), to which Uebel (2015) responds in favour of the historical Carnap. For a sympathetic development of Carnap's distinction with an application to the realism/instrumentalism debate, see Demopoulos (2011).

[4]See Strawson (1989). Lewis's letter to Strawson continues, 'Whether or not he is a fictional character, the Hume of popular (mis?) understanding remains a figure of much interest to me. I take him to be right about some important things. I consider him vastly more interesting than your Hume. I want to carry on using him as a point of reference in discussing various questions. So I need an adjective applying to things as they are according to this perhaps fictitious Hume. Unless your view of the historical Hume gets knocked down decisively, 'Humean' is an unsuitable word—to say the least. What's the replacement? '"Humean"' with inverted commas and a footnote'.

briefly remarks that he admired the metaphysics of Carnap's *Aufbau* (1928a).

This may seem a deeply implausible exegetical claim for Lewis to have made. A large part of the work out of which the *Aufbau* arose was undertaken during the period 1922–25, *i.e.*, before Carnap came to Vienna and joined the Wiener Kreis in 1926. As Carnap later recollected,

> Even in the pre-Vienna period, most of the controversies in traditional metaphysics appeared to me sterile and useless... I developed this skeptical attitude towards metaphysics under the influence of anti-metaphysically inclined scientists like Kirchhoff, Hertz, and Mach, and of philosophers like Avenarius, Russell, and Wittgenstein.   (Carnap 1963a, 44–45)

In the *Aufbau* itself Carnap didn't argue, as he would later do in 'Überwindung der Metaphysik' and 'Empiricism, Semantics, and Ontology', that traditional metaphysical questions are meaningless or that the only intelligible external questions are practical ones. But even in the *Aufbau* he already sought to rigorously abstain from metaphysics by providing a rational reconstruction of science which was 'neutral' between competing metaphysical schemes (1928a, §178). I will return in due course to examine Carnap's efforts in the *Aufbau* to abstain from metaphysics. But Carnap's metaphysical disclaimers in the *Aufbau* notwithstanding, I will argue that Lewis was substantially correct in his exegetical claim. It really was insightful of Lewis to conceive his own metaphysical system as standing in a line of descent from the metaphysics of Carnap's *Aufbau*.

In his letter to Bricker, Lewis also suggested he had other reasons for finding affinity with Carnap *qua* metaphysician. But Lewis didn't spell his reasons out and so we must look for ourselves. To fill in the gap Lewis left, I will argue that there is a neglected phase of Carnap's intellectual development in the 1940's when Carnap endorsed, as part of his initial response to Goodman's puzzle about projection, a metaphysical scheme of properties and relations that was crucially similar to Lewis's own mature system.

To be absolutely clear, I am not advancing on the basis of Lewis's brief remarks a revisionary interpretation of Carnap as a thorough-going metaphysician. Carnap was explicit enough in his landmark writings to leave no interpretative space for a 'New Carnap' who disavowed the different versions of anti-metaphysics typically attributed whilst favouring metaphysics all along—not the kind of interpretative space that the writings of Hume and Wittgenstein leave for a 'New Hume' or a 'New Wittgenstein'.

To further clarify, I am not offering a revisionary interpretation of Lewis's philosophy as having no other significant relationship to Carnap's philosophy except a metaphysical one either. There's no more space for that kind of interpretation because, for example, Lewis explicitly acknowledged the influence of Carnap's modal semantics and Carnap's approach to scientific theories—see Lewis's 'General Semantics' (1970a, 19) and 'How To Define Theoretical Terms' (1970b, 427).[5] Rather I am telling a cautionary tale, inspired by Lewis's own historical reflections, whereby even a great anti-metaphysician like Carnap sometimes lapsed into metaphysics. Nor am I seeking here to advance or defend Lewis's metaphysical position or Carnap's for that matter, but

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[5]It is a common reflection that by the time of Carnap's death in 1970, his influence has waned and been obscured by Quine's and Goodman's criticisms of him. See, for example, Creath's claim that 'The rejection of Carnap's ideas in the period immediately after his death ran across the full gamut of his work' (Creath 2007, xiii). But this cannot be the full story because these two Lewis papers, which bear and acknowledge Carnap's influence, were themselves influential and celebrated from their publication until the present day. Carnap also had a formative role in the development of Lewis's views on probability and inductive logic. Whilst at UCLA, Lewis worked on a book manuscript, *On Confirmation*, also now in the Firestone Library and to appear in the volume of Lewis's posthumous writings edited by Jannsen-Lauret and MacBride. Lewis wrote in the introduction to *On Confirmation*, 'The point of view of these notes is almost exactly that of Carnap in his most recent work on probability; see, for instance, "The Aim of Inductive Logic" in Nagel, Suppes, and Tarski, *Logic, Methodology, and the Philosophy of Science*' (Lewis forthcoming, Carnap 1962).

rather to explore a hitherto neglected connexion between the philosophies of the historical Lewis and the historical Carnap.

I begin by laying out some of the salient features of Lewis's mature metaphysics before turning back to consider the metaphysics inherent in the *Aufbau* and Carnap's initial response during the 40s to Goodman on projection.

2. Lewis: Metaphysics, Folk Psychology, and Constitutive Rationality

Lewis is famous for his commitment to an infinite plethora of island universes ('modal realism') justified abductively by appeal to the theoretical benefits of positing them, hence the title of his major work *On the Plurality of Worlds* (1986, 3–5). Lewis's commitment to island universes is often taken to epitomise the character of his metaphysics. Williamson, for example, takes 'The Prize specimen of Lewis's speculative metaphysics' to be 'his notorious doctrine of *modal realism*' (2014, 8–9). But *Plurality of Worlds* also contains a less well-known, far less celebrated but in certain respects more far reaching and more radical piece of speculative metaphysics: Lewis's doctrine of 'constitutive rationality'. This doctrine places presumptive metaphysical limits on what the contents of our beliefs and desires can be. And it is this doctrine, I will argue, that brings Lewis into contact with the metaphysics of the *Aufbau*—because Carnap's account of intentionality in the *Aufbau* also placed presumptive metaphysical limits on what the contents of thought can be.

So what was Lewis's doctrine of constitutive rationality? Lewis held that the notions of belief and desire are implicitly defined by the basic principles of our common-sense theory of persons, the theory according to which what is distinctive about persons is that they are rational agents. According to Lewis, these common sense principles tell us how beliefs and desires are typically related to one another, sensory input and behavioural output, including a principle of 'instrumental rationality' that

people tend to behave in a way that serves their desires according to their beliefs (1986, 36). In fact, since the early 70s he had held that decision theory is approximately descriptive of how we make choices that serve our desires according to our beliefs. He went so far as to characterise decision theory as 'the very core of our common-sense theory of persons' that implicitly defines the mental states—the rest of our common-sense theory consisting of inductive methods and systems of basic intrinsic value (Lewis 1974, 337–38). But Lewis later came to recognise that decision theory didn't capture the entire core of our common-sense theory of persons. He came to think that our common-sense theory includes a non-instrumental part dedicated to a different species of rationality, one which places presumptive metaphysical limits on what the contents of our beliefs and desires can be.

In *Plurality of Worlds* Lewis sought to elicit from his readers appreciation that their common sense thinking about persons includes such a non-instrumental part. He pointed to the fact that it is part of ordinary common sense that we think some sorts of beliefs and desire are 'unreasonable in a strong sense—not just unduly sceptical or rash or inequitable or dogmatic or wicked or one-sided or short-sighted' (1986, 38). What kind of belief is it whose failings lie outside the purview of instrumental rationality, a belief that's unreasonable in this strong sense? Lewis gave the following example: 'Think of the man who, for no special reason, expects unexamined emeralds to be grue' (1986, 38). The assignment of such a belief to a person isn't ruled out by instrumental rationality because one such unreasonable belief can always be matched by a correspondingly unreasonable desire that together fit the behaviour—matching, for example, the belief that unexamined emeralds are grue with the desire for grue things. The fact that we nevertheless don't intuitively favour the interpretation of a person as expecting, for no special reason, unexamined emeralds to be grue, shows, Lewis argued, that there are 'principles of charity' implicit in our common-sense theory of persons as rational agents, principles that favour

assigning less unreasonable beliefs and desires if they fit the behaviour equally well.

Lewis's next step—a crucial one for the present narrative—was to propose that these principles of charity, which he took to guide our ordinary practice of interpreting one another, presuppose a metaphysical distinction between 'natural' properties and 'gruesome' ones. Lewis later recalled that in his early career he been 'persuaded by Goodman' that all properties are equal—so he had considered it hopeless to try to distinguish green from grue in metaphysical terms (Lewis 1999, 1). But by the early 80s Lewis had come around to thinking the distinction was both commonsense and widely serviceable. In 'New Work For A Theory of Universals' (1983) Lewis laid out the work that the distinction between 'natural' and 'gruesome' properties did for him. The most basic role Lewis identified was to distinguish properties which make for objective resemblances between things and bestow causal powers upon them from properties which are purely miscellaneous and thereby do nothing the capture the facts of resemblance or the causal powers of things. Natural properties, Lewis wrote, 'carve reality at its joints' but gruesome properties carve 'everywhere else as well' (1983, 346).[6]

Further Lewis envisaged the difference between 'natural' and 'gruesome' properties to admit of degree. Some properties, he held, are 'perfectly natural' but others are 'less-than-perfectly natural', the degree to which they're unnatural determined by the length of the chains whereby they are defined from the perfectly natural ones (1983, 347; 1984, 227–28; 1986, 61). In these terms, grue is less natural than green because, according to Lewis, the former property is defined in terms of the latter. Lewis now proposed to explain the presumptive limits imposed by the common-sense theory of persons upon what sorts of things are apt to be believed and desired by appealing to degrees of naturalness:

> The principles of charity will impute a bias towards believing that things are green rather grue . . . they will impute eligible content, where ineligibility consists in severe unnaturalness of the properties the subject supposedly believes or desires or intends himself to have. (Lewis 1983, 375)[7]

So what's the big picture here? For Lewis what emerges is that the very possibility of thought requires the metaphysics of natural properties and the less-than-natural properties defined in terms of them. Lewis held that to be a thinker is to be rational and to be rational involves thinking more eligible rather than less eligible thoughts where the eligibility of a thought is determined by the degree of naturalness of the properties ascribed. For Lewis it's *a priori* that thoughts which ascribe more natural properties are more apt to be believed and desired because, according to him, that's how the notion of thought is implicitly defined by our common-sense theory of persons.

Lewis sought to provide further support for this outlook by arguing that if no such constraints are placed on the eligibility of content then radical indeterminacy threatens. This is because unreasonable interpretations of the functional states of a thinker can be made to fit with the input stimuli and output behaviour by compensating for a misassignment of content to one state by misassignment to another (1983, 374–75). To enable us to appreciate, as he saw it, how common-sense has a built-in safeguard to fend off the possibility of radical indeterminacy arising from perverse but compensating misassignments, Lewis described the legitimate assignment of content as one might describe a handshake, as an act of cooperation between two parties. The two parties whose cooperation are required for determinate beliefs

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[6]Lewis also found the distinction serviceable in connection with a broad range of other topics including duplication, supervenience, materialism and the analysis of lawhood and causation (1983, 344).

[7]See Stalnaker (2004, 236–39) and Janssen-Lauret and MacBride (2020a) for discussion of the role of naturalness in Lewis's account of intentionality that begins with the propositional attitudes.

and desires are, respectively, the (inside) functional organisation of the cognitive subject and the (outside) form of the world:

> It takes two to index states with content, and we will not find the constraint if we look for it always on the wrong side of the relationship. Believing this or desiring that consists in part in the functional roles of the states whereby we believe or desire, but in part it consists in the eligibility of the content. And this eligibility to be thought is a matter, in part, of natural properties.
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> (Lewis 1983, 375)

This doesn't mean, as Lewis explained, that thinkers are built to take a special interest in natural properties: 'There's no contingent fact of psychology here to be believed, either on evidence or daringly' (1983, 377). Nor does it mean natural properties have their naturalness conferred on them by us. To go either way would be to commit the error of conceiving determinate thought as a one-sided achievement. Rather, Lewis maintained, it means that such thought is possible only if the cognitive subject and the world are appropriately congruent—absent that felicitous situation the light of determinate thought goes out.

Lewis realised that Goodman would have been unmoved by all this. Goodman held all properties to be equal because he thought it makes no sense to appeal, as Lewis had done, to the joints of reality itself. According to Goodman 'There is no such thing as the structure of the world for anything to conform or fail to conform to' (1960a, 56). By his lights, we cannot compare a description or theory with the structure of an unconceptualized reality independent of us but only with another description or theory. To call a kind or property 'natural' suggests something absolute, something privileged by nature itself, so independent of context and human interest; but, Goodman maintained, 'natural' here can only mean 'habitual' or 'traditional' or 'entrenched', *i.e.*, by past projections we have historically made, or, in some contexts, 'devised for a new purpose' (Goodman 1955, 96–97; 1970, 444; 1978, 6–10; Putnam 1979, 611–12).

Of course Lewis didn't believe in natural properties solely because of their role in his theory of content but also because, they had other roles for him too—for example, in his theory of laws and causation (1983, 365–70). But Lewis's direct response to Goodman was to make the Moorean move that, as Lewis put it, we should be 'reluctant to accept theories that fly in the face of common sense' (1986, 134). As Lewis famously enjoined us, 'Never put forward a philosophical theory that you yourself cannot believe in your least philosophical and most commonsensical moments' (1986, 135).[8] Since, according to Lewis, the distinction between natural and gruesome properties is just a part of common sense, he took himself to be more certain of the intelligibility of the distinction than the soundness and validity of any of the sceptical arguments Goodman had brought against it. This meant Lewis felt entitled to treat Goodman's arguments as a *reductio ad absurdum* of their conclusion, *i.e.*, that sharing of grueness is just as much a respect of similarity as sharing of greenness is. Hence, Lewis wrote in a letter, 'Myself, I think Goodman's scepticism is a bizarrely uncommonsensical view. The burden of proof is on Goodman, not on his commonsensical opponents' (Lewis to Vallentyne, 25 September 1995). Lewis admitted that it might with some justice be complained that he had himself failed to provide a detailed account of how less-than-natural properties are defined in terms of more natural ones. But, he continued along Moorean lines, 'It would be

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[8]Many commentators have emphasised the influence of Quine on Lewis's philosophy and the continuities between them. See, for example, Moore (2012, 331–37), Williamson (2014, 9–12), Soames (2015, 83), and Janssen-Lauret (2017). But Lewis's prominent commitment to common sense as part of a broader theoretical conservatism marks a significant methodological contrast with Quine for whom common sense was only worthy of respect insofar as it anticipates science (Quine 1957, 2). But for present purposes, investigating the relationship between Lewis and Carnap, it is not necessary to delve further into the relationship between Quine and Lewis. See Beebee and MacBride (2015) and Janssen-Lauret and MacBride (2015, 2018, 2020b) for further exploration of the relationship between Quine and Lewis.

nice to have a developed theory of disjunctiveness of properties, but it is not obligatory to present such a theory before we are entitled to draw the distinction—exactly as it is not obligatory to present a developed theory of felinity before daring to distinguish cats from dogs'. Lewis also appreciated that Goodman would be unmoved by Lewis's appeal to common sense. As he wrote in another letter, 'Stubbornly, proudly, he [Goodman] follows where argument leads, and if it leads into a most ghastly reductio, he has the courage to press on' (Lewis to Devitt 27 February 1991). Nevertheless, Lewis continued, 'That's in some ways an admirable madness—virtue carried to excess—but of course it's madness still. To understand is not to forgive. Whatever the explanation, what we know best is that something has gone terribly wrong'.

Whether, saying this, Lewis was being fair to Goodman is another matter. One recurrent theme of Goodman's philosophy is that what counts as the same for us is constantly in a process of 'reweighting' or 'reordering' or 'reshaping' as our tradition evolves in response to our shifting needs and interests (Goodman 1978, 17, 138–39). So Goodman would have held that Lewis's brand of philosophical conservativism makes no sense because there is no stable body of common sense theory committed to a univocal distinction between natural and less than natural properties whose inherited credence establishes a burden of proof in its favour.

It is not necessary for us to resolve the dispute between Lewis and Goodman over natural properties because our present purpose is not to adjudicate between them but the historical one of clarifying the relationship between Lewis and Carnap. And we now have enough of Lewis's philosophical system on the table to appreciate how very far apart metaphysician Lewis and anti-metaphysician Carnap truly were. Carnap sought to overcome traditional metaphysics by showing its claims to be either pseudo-statements, or, if genuine statements, only internal ones whose truth-values are to be settled according to the rules

of the linguistic framework we've adopted, where it is a matter of pragmatic choice which linguistic framework we adopt. Lewis, of course, asserted the reality of possible worlds, didn't take this merely to be a consequence of the rules of the language he'd adopted, and took his assertion to mean more than affirming the 'efficiency' of a linguistic framework. But even this description of their differences underestimates the distance separating them. Lewis argued that it is impossible to understand thought and language—which he conceived as a conventionally orchestrated medium for the expression of thought—unless a metaphysics is presupposed of a system of natural properties whose existence and nature is fixed independently of how we think and talk, properties which 'carve reality at the joints' thereby furnishing a worldly source of determinate content. So, for Lewis, there's no avoiding metaphysics or holding metaphysics at arm's length by eschewing 'pseudo-statements', or distinguishing 'internal' from 'external questions', or 'semantic ascent', because neither thought nor any language makes sense as unalloyed metaphysically-neutral media of representation. Anti-metaphysics of Carnap's kind makes no sense from Lewis's point of view because, for Lewis, to think determinately is to think in ways that correspond (to some significant degree) to the joints in nature itself.

The historical irony is that the metaphysics whose endorsement placed Lewis at such a remove from anti-metaphysician Carnap, is akin to the metaphysics of intentionality which Lewis found in Carnap's *Aufbau*. The immediate evidence for this claim comes from a letter Lewis wrote to Bricker, who was formerly Lewis's student. Bricker had effectively suggested combining Lewis's doctrine that natural properties are required to explain the possibility of determinate thought with the Frege-Russell doctrine that universality is a defining mark of logic (Frege 1893, xv). Since, at least according to Lewis, naturalness is presupposed by *any* kind of (determinate) description of reality, it follows that there's an important sense in which the notion of natu-

ralness is universal because nothing can be described without assuming it; hence, naturalness is a part of logic. Lewis responded to Bricker's suggestion, 'Naturalness "a part of logic". Is this swift remark meant to echo the *Aufbau*, last paragraph of section 154 (also swift)? Whether or not you had it in mind, I suggest citing this little-known passage. It's part of why I admire Carnap much more as a metaphysician than as an anti-metaphysician' (Lewis to Bricker, 1991, 6 April 1992).[9]

We can at least surmise from this letter that Lewis interpreted Carnap as having embraced or come close to embracing the notion of naturalness which informed Lewis's own scheme, Carnap holding moreover that naturalness is a part of logic. Since Lewis did not himself deem naturalness a part of logic, what Lewis appears to be saying is that he admired Carnap as a metaphysician because of what they had in common, assigning a significant role to naturalness.

Without bringing to bear the text of the *Aufbau* itself, Lewis's brief comment doesn't convey much else. But Lewis had been a close reader of the *Aufbau* in his youth, devoting one of his earliest publications, 'Policing the *Aufbau*' (1969), to a partial defence and upgrade of Carnap's work, a paper written during his time at UCLA before he went to Princeton—indeed written whilst Carnap was still alive and an emeritus professor at UCLA.

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[9]In *Aufbau* §154 Carnap introduces the concept of 'founded, relation extensions' as 'relation extensions which correspond to experienceable, "natural relations"'. The relevant passage from the final paragraph of §154 to which Lewis draws Bricker's attention reads, 'The concept of foundedness is *undefinable*. It cannot be derived from constructed concepts, since it is the most fundamental concept of the constitutional system. It also cannot be derived from the (customary) basic concepts of formal logic. On the other hand, it does not belong to any definite extralogical object domain, as all other nonlogical objects do. Our considerations concerning the characterization of the basic relations of a constitutional system as founded relation extensions of a certain kind hold for every constitutional system of any domain whatsoever. It is perhaps permissible, because of this generality, to envisage the concept of foundedness as a concept of logic and to introduce it, since it is undefinable, as a *basic concept of logic'*. I consider this passage further in Sections 5 and 6 below.

Delving into the text of *Aufbau*, I will argue, Lewis's comment can be seen to reflect an intelligent and perceptive reading of Carnap's work.

A caveat: I don't mean to imply thereby that Lewis had kept up with the great boom in publications devoted to the historical Carnap that had begun in the 80s. Lewis's only publication that explicitly engages with Carnap's text, 'Policing the *Aufbau*', reflects Nelson Goodman's influence on the early Lewis, as indeed the later Lewis confirmed (Lewis 1998, 4). This is hardly surprising since, whilst a graduate student at Harvard, Lewis had taken Goodman's course at Brandeis on *The Structure of Appearance* (1951), a work in which Goodman provides both a commentary on the *Aufbau* and an alternative system inspired by it (Lewis to Smart, 16 February 1965). As Goodman had done, Lewis engaged in 'Policing the *Aufbau*' with the *Aufbau* as a going philosophical concern rather that as something philosophically antiquarian. And this remained Lewis's mode of engagement with Carnap in his later reflections. It is at any rate apparent that Lewis hadn't been keeping up with the latest literature on the *Aufbau* when he wrote his letter to Bricker in 1992. By the early 90s, section 154 of the *Aufbau*, which Lewis recommends in his letter, so far from being 'little-known' as Lewis called it, had become well-known amongst Carnap commentators and its perceived failings notorious—a symptom of the fact, it had become widely recognised, that the *Aufbau* was philosophically dead in the water.

3. Goodman, Early Lewis, and Carnap's *Aufbau*

The declared aim of the *Aufbau* is to establish a 'constitutional system' ('Konstitutionssystem'), which shows how all objects can be constructed from certain basic ones.[10] Carnap explains

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[10]In his 1966 translation of the *Aufbau*, Rolf George followed Goodman's practice in *The Structure of Appearance* (1951) of using the technical term 'con-

'constitution' in terms of reduction, where an object is reducible to one (or more) other objects if every statement about the former can be transformed into a statement about the latter. So, in a constitutional system, all objects are reducible to the basic ones. In the *Aufbau* Carnap concentrated upon developing a phenomenalistic system, an 'autopsychological' one, where the basic objects are momentary cross-sections from one's stream of experience which bear to one another the basic relation: recollection-of-similarity. Carnap intended his phenomenal construction to eventually cover all of science but only the lower steps of the construction are worked out in any detail.

Even though he recognised the veracity of alternative constitutional systems and briefly sketched a physicalist one, his phenomenalistic system had an especial significance for Carnap, namely that 'it not only attempts to exhibit, as any system form, the order of the objects relative to their reducibility, but that it also attempts to show their order relative to *epistemic primacy*' (1928a, §54). Because Carnap intended his system to recapitulate the epistemic order in which objects are recognised, he conceived his basic objects as whole experiences, because they are what is given to us first of all: 'we have to proceed from that which is epistemically primary, that is to say, from the "given", *i.e.*, from experiences in themselves in their totality and undivided unity' (1928a, §67).

To construct replacements for the constituents of experiences, he developed a method he called 'quasi-analysis' (1928a, §71). Using this method, objects which are pre-theoretically conceived outside Carnap's system as constituents of analysable experiences, for example qualities, are replaced by certain classes of experiences where experiences themselves are taken as un-

analysable units. So, for Carnap, it was vital to establish that qualities conceived as ingredients of experience can be replaced by 'quality classes' whose ur-elements are whole experiences under the basic relation recollection-of-similarity (1928a, §§108–12). He began by introducing 'part similarity' as the relation which two basic experiences bear to one another if one is recollected-as-similar to the other. Then he defined the notion of a 'similarity circle' as a maximal class of basic experiences, connected pairwise by part similarity, so each member of the similarity circle is part similar to each other—a class which is maximal in the sense that no basic experience outside the circle is similar to every member. Since the members of a similarity circle need not share, intuitively speaking, any one quality, he introduced the more exacting notion of a 'quality class' as a certain class of experiences which belongs to every intersecting similarity circle containing at least half its members. If the underlying basic experiences are reasonably varied then all the members of a quality class have, pre-theoretically speaking, a quality in common. Carnap took this to mean that on condition that basic experiences are reasonably varied, the notion of a quality class captures what is significant about the notion of quality even though basic experiences have no constituents.

Famously Goodman, in the *Structure of Appearance*, argued that the notion of a quality class is still an inadequate replacement for the familiar notion of a quality as it serves in our ordinary descriptions of experience—because circumstances can foreseeably arise in which some experiences belong to the same quality class but informally speaking there is no quality they have in common. This was Goodman's problem of 'imperfect community', circumstances in which experiences form a quality class in virtue of overlapping similarities but lack a quality in common (1951, 124–26). Consider, for example, *r* which is white, round and hard, *s* which is black, square and hard and *t* which is white, square and soft. They form a similarity class because each of the three is similar to each of the others but, intuitively

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structional system' as an English rendition of 'Konstitutionssystem' (Translator's Preface, *xx*). More recently, commentators sensitive to the Kantian and neo-Kantian resonances of the original German have favoured 'constitutional system' as a translation. See Friedman (1992, 15 n 1), and Richardson (1998, 6 n 3). Here I follow the latter practice.

speaking, they have no common quality. Goodman also raised the problem of 'co-companionship', circumstances in which experiences form a quality class in virtue of systematic connections between distinct qualities. Suppose that a certain colour only occurs as a 'companion' of another, say a dark blue and a slightly lighter shade of blue always adjacent to one another. Then the experiences in which they occur will form a quality class because each experience in the class is similar to each of the others, but intuitively speaking, more than one colour features in each experience (1951, 122–24). Given Carnap's definition of 'quality' in terms of 'quality class', whereas the possibility of a circle of imperfect community threatens to generate too many qualities, the possibility of co-companions threatens Carnap with too few. This means that Carnap must rely upon the empirical assumption that such 'unfavourable circumstances' don't ever happen—and, indeed, Carnap had already shown himself willing in the *Aufbau* to make empirical assumptions of this kind to rule out other awkward cases for his account (1928a, §70). But the likelihood of these unfavourable circumstances ever happening Goodman considered to be by no means negligible. Nonetheless, Goodman didn't think the *Aufbau* a write-off. The potential importance of the *Aufbau* to philosophy, he declared, 'is comparable to the importance of the introduction of Euclidean deductive method into geometry'; the *Aufbau*, he affirmed, cannot 'be relegated to the status of a monument having purely historical interest. Its lessons have not been fully enough learned' (Goodman 1963, 558).

Lewis evidently felt strongly too that the *Aufbau* wasn't merely an historical monument. In 'Policing the *Aufbau*' he spoke up to defend Carnap. In his 'Intellectual Autobiography', Carnap had responded to the problems Goodman raised in *Structure of Appearances* that, 'I do not think that these inadequacies are as serious and as disastrous as Goodman thinks. It is clear that most of these defects can easily be avoided by using a more comprehensive basis' (Carnap 1963b, 946). But Lewis took a somewhat

different line in Carnap's defence, emphasising the fact that the *Aufbau* is intended as a 'reconstruction' of our empirical knowledge, so not held to the same standards of exactitude as an 'analysis' but merely a serviceable replacement under actual circumstances. Lewis wrote,

> The *Aufbau* is commonly dismissed as a failure because discrepancies would appear under unfavourable circumstances. That verdict is premature. If there are few discrepancies under actual circumstances, the constructed concepts might be just as adequate for science as the familiar ones they approximate and replace. A mere chance of discrepancies is too bad, but not fatal. It would take frequent discrepancies to spoil the construction, by Carnap's own standards. (Lewis 1969, 3)

Nevertheless, Lewis went on to argue that additional qualifications might be placed upon quality classes to 'help fight the difficulty Goodman calls "imperfect community"' (1969, 14).[11]

In the *Aufbau* Carnap had defined a 'sense class', intuitively speaking a sense modality such as the visual or the auditory, as a maximal class of quality classes connected by chains of similarity (1928a, §115). Relying upon a distinction between 'genuine' and 'spurious similarity', Lewis pointed out that a genuine quality class, which isn't merely a class of experiences forming an imperfect community, will belong to a sense class and so be 'genuinely similar' to many other quality classes. But, Lewis observed, a spurious quality class, for example, a mere circle of imperfect community, is likely to be genuinely similar to few other quality classes, adding 'There is no evident reason why it should be more susceptible to spurious similarity than a genuine quality class' (1969, 16). In light of this, he proposed to define the genuine

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[11]Like Carnap's and Lewis's, Friedman's assessment of the situation vis-à-vis imperfect community and co-companionship is sanguine, 'I think these difficulties may not be as serious as Goodman takes them to be; Carnap [(1928a, §122)] is quite explicit that his constructions are not fashioned a priori, as it were, but depend on empirical assumptions that may issue in substantial revisions if the system is false' (Friedman 1987, 541).

quality classes as the ones that remain once the system has been purged of quality classes that are similar, genuinely or spuriously, to only a small number of other quality classes. Lewis conjectured that if the more demanding conditions are met, classes of experiences forming an imperfect community are less likely, hence the prospects more favourable of 'quality class' serving as an adequate replacement for 'quality'.[12] (In 'Policing the *Aufbau*' Lewis didn't mention the problem of 'co-companionship' presumably because he recognised that separate conditions would need to be imposed to exclude cases of co-companionship).

What's noteworthy for our historical purposes isn't just, that for Lewis it remained, 'an open question whether the *Aufbau* succeeds or fails on its own terms' (1969, 14). It's that Lewis relied in 'Policing the *Aufbau*' upon a distinction between 'genuine' and 'spurious similarity'. This not only anticipates Lewis's later use of naturalness but tells us something about how Lewis understood the *Aufbau* on its own terms—specifically that the *Aufbau* relies, in Carnap's terms, upon the distinction between 'founded' and 'unfounded' relations (a distinction to be explained in due course).

The more general philosophical interpretation of the *Aufbau* to which Lewis was introduced by Goodman in his 1965 metaphysics class at Brandeis described the *Aufbau* in the following terms: 'It belongs very much in the main tradition of modern philosophy, and carries forward a little the effort of the British Empiricists of the 18th century' (Goodman 1963, 558). But this didn't mean that Goodman read the *Aufbau* as Locke or Hume revived by a dose of modern logic, 'The old idea that philosophy aims at writing the story of the cognitive process had already been abandoned in the *Aufbau*' (1963, 548). Rather, Goodman continued, the function of Carnap's auto-psychological system

'is not to portray the genesis—either actual or hypothetical—of ideas, but to exhibit interconnections between them. The consideration relevant in choosing elements for a system is thus not primacy in the cognitive process but serviceability as a basis for an economical, perspicuous and integrated system' (1963, 548–49). In 'Two Dogmas of Empiricism' (1951) Quine had already described Carnap as standing in a line of intellectual descent from Locke and Hume, only more thoroughgoing than them, as 'the first empiricist who, not content with asserting the reducibility of science to terms of immediate experience, took serious steps towards carrying out the reduction' (Quine 1951, 37). In later works, Quine stuck to this 'phenomenalistic' interpretation of the *Aufbau*, albeit finding naturalistic analogues of Carnap's elementary experiences and the relation of recollected similarity within his own reconstruction of our empirical knowledge (1974, 16, 136; 1995, 15–19). But Goodman's interpretation of the *Aufbau* as bearing especial significance because of its emphasis upon system building takes us in a different direction, indicating a more radical shift in philosophical perspective than Quine ever recognised, a shift which set Carnap apart from Locke and Hume.[13] But Goodman's interpretation still has the shortcoming of failing to explain why systematic 'interconnections' had become so significant for Carnap's outlook.

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[12]Lewis's approach to the problem of imperfect community in 'Policing the *Aufbau*' should be distinguished from the very different suggestion in 'New Work For A Theory of Universals' that the problem might be addressed using a variably polyadic and contrastive primitive of resemblance (1983, 348).

[13]Famously, Quine argued in 'Two Dogmas' that Carnap's reduction fails in a manner which is fatal for phenomenalism in general, *viz.*, that it fails to provide a recipe for eliminating physical vocabulary in favour of the language of sense-experience (Quine 1951, 37–38; 1969, 76–77; Putnam 1975, 19–20). Whilst Friedman acknowledges that Goodman was not party to the anti-phenomenalist consensus to which Quine's criticisms of Carnap gave rise, Friedman also claims 'he [Goodman] does appear to agree, however, that it is in connection with the issue of phenomenalism that the *Aufbau* finds its primary significance' (1987, 541). But Friedman's impression can't be right in light of Goodman's explicit statement that even the function of the auto-psychological system is primarily the systematic one of exhibiting the interconnections between ideas. See Cohnitz and Rossberg (2006, 120–21) for further evidence, drawn from Goodman's PhD thesis *A Study of Qualities* (1941, 96–98) that Goodman didn't interpret Carnap as any kind of foundationalist.

This shortcoming was addressed by a shift in Carnap scholarship, owed to Coffa, Friedman, and Richardson, a shift from interpreting the *Aufbau* as an empiricist work in the tradition of Hume in favour of interpreting it as a contribution to a Kantian tradition.[14] Their reading of the *Aufbau* downplays those passages in which phenomenal reduction takes centre stage, the ones which led to Quine and Goodman interpreting Carnap as more Humean, whilst emphasising those passages in which Carnap dwells upon the relationship between the notions of structure and objectivity, passages they interpret as bearing a Kantian imprint.[15] Let's go back to the *Aufbau* to see how this works out.

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[14]See Coffa (1985; 1991, 223–39), Friedman (1987; 1999), and Richardson (1998). Uebel (2007, 42–54) proposes a compatibilist interpretation which finds insights in both the neo-Kantian reading of the *Aufbau* and the more familiar empiricist interpretation offered by Quine. Uebel's compatibilism has considerable plausibility—after all, you can be a follower of both Hume and Kant—although Uebel attributes strong foundationalist notes to Quine's interpretation of Carnap which I doubt reflect Quine's reading of him. Consider, for example, Quine's reflection in 'Epistemology Naturalised' that 'The Cartesian quest for certainty had been the remote motivation of epistemology, both on its conceptual and its doctrinal side; but that quest was seen as a lost cause' (1969, 74). 'What then', Quine asks, 'could have motivated Carnap's heroic efforts?'. Quine admitted the following as a good reason: 'such constructions could be expected to elicit and clarify the sensory evidence for science, even if the inferential steps between sensory evidence and scientific doctrine must fall short of certainty' (1969, 74–75). Other interpretations of the *Aufbau*, emphasising different lines of historical lineage to Russell and Husserl, include Pincock (2002) and Carus (2007, 139–84; 2016).

[15]In 'Carnap and Logical Truth', originally written in 1954, Quine traced the following line of connexion between Kant and Carnap. Kant had asked the question 'How are synthetic *a priori* judgements possible?', thinking arithmetical judgements a shining example. But Frege's reduction of arithmetic to logic had forced attention to switch to the logically prior question, 'How is logical certainty possible?'. Quine wrote, 'It was largely this question that precipitated the form of empiricism which we associate with between-war Vienna—a movement which began with Wittgenstein's *Tractatus* and reached its maturity in the work of Carnap' (Quine 1963, 385). But what Quine has in mind here is not the *Aufbau*, which isn't mentioned by him, but the *Logische Syntax der Sprache* (1934) in which Carnap advanced his linguistic doctrine of logical

4. Structure and Objectivity in the Aufbau

In the *Aufbau* Carnap was deeply impressed by the Janus-faced character of knowledge. On the one hand, he recognised that 'all knowledge' has a 'subjective origin' in our experiences. On the other hand, he also recognised that knowledge is knowledge of 'an intersubjective, objective world' (1928a, §2). By providing a phenomenalistic constitutional system he sought to demonstrate how it is possible for knowledge to be subjective in origin; by constructing all objects from a phenomenal base, Carnap endeavoured to show how all one's knowledge springs from a subjective source, the stream of experience given to one. But to establish that we have knowledge of an 'intersubjective, objective world', as Carnap put it, he also used the constitutional system to demonstrate that our knowledge of objects consists in knowledge of structural relationships which are not only realised in one's own stream of experience but capable of being realised in streams of experience belonging to different subjects.

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truth. The *Aufbau* was indeed a station along the way to that later work; in the *Aufbau* Carnap tells us that 'Logic (including mathematics) consists solely of convention concerning the use of symbols, and of tautologies on the basis of these conventions' and that logical symbols do not designate objects but are 'symbolic fixations of convention' (1928a, §107). But the focus of the *Aufbau* isn't logical truth and its emphasis upon structure isn't there to answer Kant's question about the possibility of synthetic *a priori* judgements but to explain the intersubjectivity of science. Quine's hypothesis about what historically precipitated 'the form of empiricism which we associate with between-war Vienna' seems partial at best. In his 1980 Immanuel Kant lectures, *Science and Sensibilia*, however, Quine returned to the Kantian question with which he had begun 'Carnap and Logical Truth', describing what he took to be the concern he held in common with Kant, although Carnap isn't mentioned: '"How are synthetic judgments a priori possible?" That was Kant's momentous question, and the *Critique of Pure Reason* was his monumental answer. The question that will be exercising me in my less than monumental series of Immanuel Kant Lectures is a plainer one, but it expresses much the same concern: How, on the strength of the mere sporadic triggering of our sensory receptors, is it possible to fabricate our elaborate theory of other minds and the external world?' (Quine 1980, 19).

Carnap expressed the problem of how knowledge might be objective even though subjective in origin, in the following terms,

> Since the stream of experience is different for each person, how can there be even one statement of science which is objective in this sense (i.e., which holds for every individual, even though he starts from his own individual stream of experience)?

Carnap answered:

> The solution to this problem lies in the fact that, even though the *material* of the individual streams of experience is completely different, or rather altogether incomparable, . . . certain *structural properties* are analogous for all streams of experience.
>
> (Carnap 1928a, §66)

It is because, Carnap continued, '*science is essentially concerned with structure*' that, '*there is a way to construct the objective by starting from the individual stream of experience*' (1928a, §66, his italics). To make good on his proposed solution, Carnap set out to sketch how each scientific statement might be transformed into a purely structural statement in which each name, whether particular or general, for an object is replaced with a structural definite description of the object. A structural definite description identifies an object by its unique position in a structure or network of relationships, thereby obviating any need to ostend material drawn from any individual stream of experience in order to pick the object out. As Carnap explained,

> The series of experiences is different for each subject. If we want to achieve in spite of this, agreement in the names for the entities which are constructed on the basis of these experiences, then this cannot be done by reference to the completely divergent content, but only through the formal description of the structure of these entities.
>
> (Carnap 1928a, §16)

Following Russell, Carnap conceived of definite descriptions as analysable in terms of quantifiers and variables, as saying that there is at least one and at most one object in the given domain.

Since Carnap intended general names to be replaced by structural definite descriptions too, Carnap was thereby committed to the programme of eliminating all terms standing for relations in favour of (higher order) quantifiers and variables.

Carnap's programme to account for the objectivity of scientific knowledge by appealing to a form/content distinction, echoes Kant's use of the distinction between the formal features supplied by the faculty of understanding that structures our experience and the content which is the sensory given. As Friedman explains Carnap's programme, 'Scientific knowledge is objective solely in virtue of its form or structural properties and these properties are expressed through the "places" of items of knowledge within a unified system of knowledge' (1987, 529). Of course, Kant himself deemed formal logic too weak to furnish a basis for objectivity and he took the questionable step of inventing transcendental logic to remedy the lack. But Kant knew only the 'old logic', whilst Carnap had to hand the far more powerful 'new logic' of Frege and Russell with which to explicate scientific knowledge. By these lights, Carnap is Kant upgraded with the 'new logic', seeking objectivity through higher-order structural descriptions.

The neo-Kantian interpretation of Carnap has the merit of explaining the distinctive significance of Carnap's distinction between the content and form of experience in the *Aufbau*. But it also has the consequence that if Carnap was a neo-Kantian then the *Aufbau* is philosophically dead in the water because of an objection that Carnap himself raised in §153 of the *Aufbau*. Carnap sought to address the objection in §154–55, but if he was a neo-Kantian, his suggestion for a solution is hopeless. This includes the section of the *Aufbau* that Lewis recommended in his letter to Bricker that he cite, §154. To pull together the different threads of the historical narrative, I devote the next section to spelling out Carnap's *Aufbau* objection to himself and his provisional solution.

5. The Problem of Eliminating the Basic Relations

Carnap, we have seen, used quasi-analysis to reduce statements *prima facie* about qualities to statements about classes of experiences bearing the relation of recollection-of-similarity. But this leaves one general name still needing to be replaced by a structural definite description if the programme of the *Aufbau* is to be carried to completion: the name of the relation which quasi-analysis in the autopsychological system takes as primitive, recollection-of-similarity itself. So, as Carnap appreciated,

> after the constitutional system has carried the formalisation of scientific statements to the point where they are merely statements about a few (perhaps only one) basic relations, the problem arises whether it is possible to complete the formalisation by *eliminating from the statements of science these basic relations* as the last non-logical objects. (Carnap 1928a, §153)

To solve this problem Carnap initially speculated that recollection-of-similarity may be uniquely identified as the relation which performs the theoretical role of being the basic relation of a constitutional system, in this case a phenomenal system, which succeeds in reducing such-and-such higher-level statements of empirical fact down to a phenomenal base. But as Carnap immediately pointed out, it is inevitable, given (1) the plenitude of relations he recognised, and (2) the character of the constitutional systems he envisaged, that there will be more than one relation fit to perform the theoretical role of being a basic relation for a constitutional system capable of reducing in a certain way such-and-such statements of empirical fact.

Carnap conceived of relations extensionally, hence conceived of the basic relation recollection-of-similarity as determined by a list of ordered pairs of basic experiences. Carnap did so because whilst he conceived questions about how things are correlated by a relation, *i.e.*, 'between which pairs of objects does the relation hold', as genuine, he eschewed questions about the nature or essence of a relation, *i.e.*, 'what it is between the cor-

related objects, by virtue of which they are correlated, as 'metaphysics' (1928a, §20). Because he conceived of a relation as determined by a list of pairs, Carnap recognised that alongside recollection-of-similarity there are other relations determined, intuitively speaking, by 'arbitrary, unconnected pair lists', which arise from the permutation of basic experiences (1928a, §154). In fact, Carnap recognised, there are many relations, isomorphic to recollection-of-similarity, determined by the arbitrary pair lists which arise from a one-to-one transformation of the set of basic experiences into itself. But, Carnap continued, constitutional systems only sketch—by design—a structure or network of relationships amongst basic entities. But such a structure or network will be realised not only by a given relation amongst basic entities but by any isomorphic relation. And inevitably there will be a plenitude of such isomorphic relations, arising from the one-to-one transformation of the set of basic experiences into itself.

Carnap's idea to get around this problem was to restrict the supply of relations eligible to be the basic relation of a constitutional system to relations whose extensions aren't arbitrary but consist of pairs which 'have something in common that can be experienced', relations which Carnap describes as 'experienceable, "natural" relations' (1928a, §154). Carnap introduced the notion of 'foundedness' to describe what was distinctive of experienceable, natural relations but not their isomorphic but arbitrary companions. Because he doubted it was definable in other terms, he introduced 'foundedness' as a primitive. His proposal then was to exploit this primitive to eliminate the one remaining general name ('recollection-of-similarity') in his system in favour of a higher-order definite description of the form: 'the unique founded relation which performs the role of a basic relation in a construction system in which such-and-such statements of empirical fact can be reduced'.

In the *Aufbau*, we have seen, Carnap sought to address the problem of objectivity, which Carnap equates with the intersubjective validity of science, the fact that scientific statements are

capable of being shared amongst different subjects with different streams of experience, by advancing a kind of logicism about science. Of course, this wasn't logicism in the strong sense in which Frege and Russell had advocated logicism about mathematics: that all mathematical statements can be transformed into statements whose vocabulary is exclusively logical, statements which can then be deduced from logical axioms alone. It was rather logicism in the weaker sense that all statements of the relevant class—in Carnap's case, science—be transformed into statements consisting solely of logical vocabulary. Specifically, Carnap sketched how to transform statements of science into statements consisting of quantifiers and variables describing the structure of experience. Logicism about science, in this sense, promised a solution to the problem of objectivity because neither an understanding of logical vocabulary nor the truth or falsity of a structure statement presupposes a grasp of material drawn from any particular stream of experience. But the difficulty, as Carnap pointed out, is that 'foundedness' is not a piece of logical vocabulary: 'it cannot be derived from the (customary) basic concepts of formal logic' (1928a, §154).

Carnap's response to this difficulty was to argue that 'foundedness' is relevantly similar to the concepts which we customarily take to be logical. Carnap doesn't explicitly note that 'foundedness' is a second-order predicate, but it is important to be clear about this if we're to understand him. The predicate 'founded' isn't used by Carnap as a first-order predicate to describe material drawn from a stream of experience that can only be picked out by ostension from the point of view of a given subject. Rather 'founded' is used by him as a second-order predicate to describe a property of relations. It's a property which can be had by a relation just so long as its extension consists of pairs of basic elements that have the potential to be experienced by a subject as having something in common. It follows that foundedness is a property that can be had by a relation belonging to any domain just so long as it satisfies this condition. Hence, as

Carnap explicitly recognised, foundedness 'does not belong to any definite extralogical object domain, as all other nonlogical objects do' (1928a, §154). In this respect, 'foundedness' is similar to one paradigmatically logical concept, namely 'generality', the universal quantifier—a second-order predicate which can be applied to any propositional function regardless of the domain from which its arguments are drawn. So, Carnap suggested, in the final paragraph of §154, albeit provisionally, that the concept of foundedness might be introduced as a basic concept of logic because it has some of the generality of application possessed by 'generality' itself. And this is the *Aufbau* passage which Lewis described in his letter to Bricker as 'little known' but 'part of why I admire Carnap much more as a metaphysician than as an anti-metaphysician'.

What did Goodman make of Carnap's invoking foundedness in §154? Goodman does not address the matter directly. But in the *Structure of Appearance*, Goodman put forward, in departure from Carnap, a novel adequacy constraint on constructional definitions that 'the definiens be extensionally isomorphic to the definiendum' (1951, 12). In a footnote Goodman remarks, 'Carnap, in the *Aufbau* (Sections 10–16, 153–55) discusses at some length a kind of isomorphism much stronger than that in question here' (1951, 12 n 5). Goodman wrote that he preferred his notion of isomorphism because, unlike Carnap's, his didn't rely upon 'a translation criterion of extensional identity'. In support of this claim, Goodman invoked §35 of the *Aufbau* which reads, 'an object is said to be "reducible" to others, if all statements about it can be translated into statements which speak only about these objects'. This is an extensional criterion insofar as it only permits reductions or definitions of the same object which are extensionally equivalent. By contrast, Goodman's weaker constraint allows for extensionally divergent definitions of a given object so long as the extensions of the different definitions are isomorphic. Goodman was thereby able to accommodate the possibility of extensionally divergent def-

initions of geometrical points—because one can define points as constructed from lines or from volumes but the definitions are structurally isomorphic—but Carnap's extensional criterion of reducibility rules this out. From Goodman's point of view then adding the further requirement to Carnap's criterion that the extensions in question be founded extensions is a step in the wrong direction, only making a bad problem worse by making an overly restrictive criterion even more restrictive. The historical irony is that Carnap, as he argued in *Aufbau* §153–55, found the extensional criterion too weak without foundedness whereas Goodman thought it too strong even without foundedness.[16]

6. Is '*Foundedness*' Logical?

By the early 90's when Lewis wrote to Bricker, §153–55 from the *Aufbau* wasn't little known but well-known. Since Lewis had studied the *Aufbau* under Goodman, interest in the *Aufbau* had waned until the neo-Kantian reading of Carnap, that came to the fore during the 80s, allowed Carnap scholars to come at that work from a new angle. But the idea that the problem of eliminating the basic relation could be resolved by invoking a new logical concept, foundedness, ran counter to how they conceived of Carnap's neo-Kantianism. So whilst they acknowledged the force of the problem that Carnap raised in §153, *i.e.*, that it was necessary for Carnap's structuralism that even the basic relations be eliminated, they conceived the suggestion of §154, that foundedness is a logical concept, as a mistake on Carnap's part, and saw no other way, even in principle, of eliminating basic relations. Does this mean that the *Aufbau* was always dead in the water, a fatally flawed work? Can we never recover the innocence of Goodman or the early Lewis for whom it remained an open question whether the *Aufbau* succeeds or fails on its own terms?

In this section I argue that Carnap's suggestion that foundedness is logical isn't fatally flawed. Lewis himself didn't conceive of naturalness as part of logic but he was clearly open-minded enough to recommend the passage to Bricker. The reading of the *Aufbau* that I propose enables us to understand both how Lewis thought it was reasonable for Carnap to conceive of foundedness as logical whilst himself considering it part of metaphysics.

Carnap's original motivation for introducing a constitutional system was to secure the objectivity of scientific knowledge whilst acknowledging its subjective origins. To achieve this goal, he aimed to transform the statements of science into statements which describe a structure capable of being realised in streams of experience belonging to different subjects—that was Carnap's neo-Kantianism. But, according to Friedman's influential assessment of the situation, 'experienceable, "natural" relations' can only mean 'relations somehow available for ostension'. Since the *Aufbau* was meant, in Friedman's words, to disengage 'objective meaning and knowledge from ostension', Friedman concludes that the *Aufbau* was 'totally undermined by Carnap's final move' (1987, 533).[17]

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[16] An alternative (compatible) speculation is that Goodman viewed 'foundedness' as an unwelcome intensional intrusion, which, like notions of meaning or possibility he eschewed as being 'far from clear' (1951, 5). Remember too that according to the *Aufbau* itself, "*there are no intensional statements. All statements are extensional*" (1928a, §45). See Küng (1967, 89–90) for a critique of the *Aufbau* along the latter lines.

[17] See also Richardson (1998, 88). Friedman has subsequently written, 'I no longer think that this difficulty is such a serious one', suggesting that the availability of a purely logical description of the distinctive topological features of the autopsychological realm will suffice for eliminating basic autopsychological relations after all (Friedman 1999, 43). But Friedman still thinks there are other 'serious, technical problems' to do with the fact that Carnap's higher-level objects cannot receive definitions which locate them at definite type-theoretic ranks (1999, 160). *Contra* Friedman, I am doubtful that even if the autopsychological realm has a distinctive topology this really addresses Carnap's problem at *Aufbau* §154 which arises from his holding an abundant conception of relations, *i.e.*, conceiving relations extensionally as 'arbitrary, unconnected pair lists'—because if there are too many relations then the autopsychological realm won't have a distinctive topology.

What this line of objections fails to take into account is that (1) it was never part of the motivation for the *Aufbau* that objective meaning be disengaged so radically 'from ostension' as Friedman suggests and (2) that 'foundedness' is a second-level predicate. Carnap's significantly more cautious aim was to secure the objectivity of scientific knowledge by demonstrating that science was 'intersubjective': to do so Carnap sought to transform statements of science into descriptions of structures or networks that are capable of being realised in different streams of experience (1928a, §16). But the intersubjectivity of structure statements isn't undermined by the additional demand that the structures or networks they describe are realised by founded or experienceable relations. This is because 'founded' or 'experienceable' isn't used by Carnap as a first-order predicate to describe material drawn from a stream of experience that can only be picked out by ostension from the point of view of a given subject. Rather 'founded' or 'experienceable' is used by him as a second-order predicate to describe a property of relations. It's a property which can be had by a relation belonging to any stream of experience whatsoever. Hence, *contra* Friedman, restricting basic relations to founded relations—experienceable ones—no whit compromises the intersubjectivity of scientific statements.

The more telling criticism comes from Carnap himself— that 'foundedness' is not a piece of logical vocabulary—to which, as we have seen, Carnap responded that 'foundedness' might be introduced as a new logical concept because, like the universal quantifier, it doesn't belong to any definite extralogical object domain. But, according to Uebel, we cannot take Carnap's suggestion seriously, the analogy between 'foundedness' and 'generality' being too slight to reckon 'foundedness' a logical concept. This is because, Uebel argues, even if it is granted that universality is a mark of logicality, 'foundedness' is far less general than 'generality'. The former, unlike the latter, 'restricts application to intended domains and rules out others; it is no longer a purely formal concept' (2007, 53). In other words, the former only ap-

plies to a domain of objects which give rise to pairs that can be experienced as having something in common, whereas the latter applies even to domains of objects pairs of which are only ever arbitrary.

Now Uebel is quite right that there is this disanalogy. But it is illuminating for present purposes to appreciate why Carnap— in the special context of the *Aufbau*—need not have been moved by this criticism. Carnap headlined the *Aufbau* as an account of how objective scientific knowledge is possible, an account which shows how we can 'advance to an intersubjective, objective world, which can be conceptually comprehended and which is identical for all observers' (1928a, §20). His basic idea was that scientific knowledge is tantamount to knowledge that structural definite descriptions are satisfied, knowledge which is genuinely intersubjective because the same structural descriptions can be realised in different streams of experience. Carnap initially attempted to put this idea into operation by transforming scientific statements into higher-order definite descriptions from which all non-logical vocabulary had been eliminated. But this attempt was beset by the problem that if all general terms, including general terms for basic relations, are eliminated, the resulting definite descriptions are trivially satisfied because of a surfeit of arbitrary pairs generated by Carnap's extensional conception of relations. Now Carnap's fix was to add the qualifying rider that the higher-order descriptions into which scientific statements are transformed be descriptions of founded relations. It's a consequence of this outlook that non-trivial scientific knowledge which is capable of being shared amongst different subjects is only possible if there are founded relations. In a domain from which founded relations are absent, non-trivial scientific knowledge cannot get a foothold. So Carnap's foundedness requirement is a universal requirement upon domains about which non-trivial thought capable of being shared amongst different subjects is possible and this provides a principled motivation for Carnap's conceiving 'foundedness' as logical even though it is

less general than 'generality'. This means that from the point of the view of the *Aufbau*, the notion of 'foundedness' is no less logical than the notion of 'number' was for Frege—because Frege held 'number' to be a logical notion in virtue of applying to everything thinkable and by thinkable Frege, like Carnap, also meant shareable.[18]

Reflection upon the significance of Carnap's autopsychological system takes us to a similar destination. Carnap was clear that this system wasn't meant to represent 'the syntheses or formations of cognition, as they occur in the actual process of cognition . . . with all their concrete characteristics' (1928a, §54). Nonetheless, Carnap meant his autopsychological system to reflect the epistemic order and he intended to show, using the system, how it is 'possible to advance' from 'the subjective origin of all knowledge', basic experiences, to an 'intersubjective, objective world, which can be conceptually comprehended and which is identical for all observers' (1928a, §2). Crucial to Carnap's account of how this advance is possible was the reconstruction of scientific claims as structural definite descriptions which are capable of being shared amongst subjects having different streams of experiences. But, as Carnap also argued, if these statements are to be non-trivially satisfied, they must be statements about founded relations. So, by Carnap's lights, the advance to knowledge of an intersubjective world, identical for all observers, is only possible if there are founded relations. So, from Carnap's point of view, 'foundedness' is required for the possibility of our having knowledge of an objective world, *eo ipso* for our having

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[18]As Frege famously maintained in his *Grundlagen der Arithmetik* (1884, §14), although he later abandoned the view in the aftermath of the discovery of Russell's Paradox. Of course, Carnap, by contrast to Frege, never endorsed the doctrine that numbers are logical objects. Carnap preferred the view that number words can be analysed in terms of quantifiers. See Carnap's 'Die alte und die neue Logik' (1930, 21). But the fact that Carnap didn't ever hold Frege's doctrine that numbers are logical objects, doesn't take away from the further fact that the notions of 'foundedness' and 'number' bear a common connection to objectivity in the philosophical doctrines of both authors.

determinate (non-trivial) thoughts which are intersubjectively available—because foundedness plays an indispensable role in his solution to the problem of objectivity as he saw it.

7. Is '*Foundedness*' Metaphysical?

All this gives us insight into why Carnap was willing to countenance the concept of foundedness as logical and why Lewis was right to see a more than casual connection with the idea that naturalness is logical—because, by Lewis's lights, naturalness is a prerequisite of determinate thought too. It remains a further question what sense if any it was appropriate for Lewis to describe Carnap's appeal to foundedness as metaphysical. Because 'metaphysics' is used in various senses, as Carnap himself reflected in the *Aufbau*, the answer to such a question 'depends entirely on what is meant by "metaphysics"' (1928a, §182).

So if Carnap did stray across the boundary line from science into metaphysics by introducing 'foundedness' into his system, then in what sense of 'metaphysics'? In the present context, it's important to distinguish between the following questions about Carnap's *Aufbau*. Did Carnap stray across the line in some sense Lewis recognised as metaphysical but Carnap didn't? Or in some sense of metaphysical that Carnap recognised but Lewis didn't? Or, more strongly, did Carnap stray over in some sense that both he and Lewis recognised? There would be interest in positive answers to the first two questions but I will argue that it's the third that merits a positive answer. Had (*Aufbau*) Carnap heard Lewis's Behrman acceptance speech or read Lewis's letter to Bricker, (that) Carnap would not have felt Lewis was talking past him.

Carnap admitted that, 'if it were found desirable to call "metaphysics" what we have called "basic science" or "cosmology", we should be perfectly agreeable and consequently would have to call metaphysics too, a science' (1928a, §182). But, of course, when Carnap expressed his own desire to steer clear of meta-

physics, his target notion of metaphysics was a different one, namely what he characterised as 'the extrascientific domain of theoretical form'. He gave especial prominence to what he took to be a decisive argument for the conclusion that the concept of reality 'in the sense of independence from cognizing consciousness' does not belong 'within (rational) science, but within metaphysics' (1928a, §176).[19] Here's the argument. Carnap had diagnosed that this concept is essential to articulating how, for example, the schools of realism and subjective idealism differ. He noted that whereas, for example, realists hold that physical objects are real, *i.e.,* independent of the cognizing subject, subjective idealists hold that thinking subjects are real but physical objects aren't. But, he argued, this 'concept of reality cannot be constructed in an experiential constitutional system' (1928a, §176). Carnap took the concept definable within his constitutional system nearest to the concept of independence from a cognizing consciousness to be the following: 'an act of volition which aims at a change of the object does not result in such a change'. But, he argued, the latter concept cannot be an adequate substitute for the former in the debate between realists and subjective idealist. It doesn't follow from the fact that something fails to satisfy the latter concept that it fails to satisfy the former. Witness the fact, Carnap pointed out, that the realist thinks there are physical objects which we can hold in our hands, objects which can be changed by an act of violation, but she/he doesn't think that such objects aren't real. Nor does it follow from the fact that something does satisfy the latter concept that it does satisfy the former. Witness the fact that the subjective idealist thinks there are physical objects which we cannot change—Carnap's example: 'a crater in the moon'—but she/he still denies reality to them. Carnap was confident that no other concept definable within his constitutional system or any other constitutional system would fare any

better as a reconstruction of the concept of reality in the sense of independence from a cognizing consciousness. So, because he assumed that the field of rational science is exhausted by what is expressible in a constructional system, Carnap concluded that the concept of reality in the sense of independence from a cognizing consciousness was a 'nonrational, metaphysical concept' (1928a, §176).

Carnap eschewed this 'metaphysical concept of reality', speculating that it belonged to 'the area of myth, which stands between science and art' (1928a, §182). Carnap acknowledged that there are certain claims made by realists and idealists that can be accommodated by his reconstruction of science—that, for example, physical objects can be distinguished from hallucinatory ones (realism) or that 'construction theory and subjective idealism agree with one another in the claim that statements about object of cognition can, in principle, all be transformed into statements about structural properties of the given' (1928a, §177). Nevertheless, Carnap continued, what divides these schools cannot be expressed within construction theory, '*They diverge only in the field of metaphysics*' whilst constructional theory '*represents the neutral foundation which they have in common*' (1928a, §178).

Lewis, however, employed the metaphysical concept of reality without Carnap's misgivings. Lewis summed up his own stance writing, 'I am an old-fashioned analytic metaphysician, in pursuit of hypotheses about what things are the elements of being and about how all else may be reduced to patterns of these elements' (Lewis to Pyke, 17 July 1990). And he took himself to be a defender of 'the realist philosophy we know and love', allowing that even an empirically ideal scientific theory might be false (1984, 221). Lewis maintained that this kind of realism, which admits the world might not be the way even a fully verified theory says it is, needs the traditional kind of realism that recognises 'joints in the world, discriminatory classifications not of our making', the kind of realism that (recall) Lewis also held to be necessary for the possibility of determinate thought (1984,

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[19]Carnap later defined 'metaphysics' more fully and explicitly than he had in the *Aufbau* as 'the field of alleged knowledge of the essence of things which transcends the realm of empirically founded, inductive science' (1959, 80).

228). It appears that Carnap and Lewis could not be at further removes over the status of reality or metaphysics. But what this assessment misses is another anti-metaphysical line of argument in the *Aufbau* which is specifically to do with the character of relations, one often overlooked whilst the argument against the 'metaphysical concept of reality' receives the headlines.[20]

Early in the *Aufbau*, Carnap identified what he took to be a genuine scientific question concerning relations, namely which pairs of objects are correlated by a given relation, what Carnap dubbed '*the correlation problem*'. He distinguished this extensional question from what he took to be a spurious metaphysical one. He wrote, 'From the correlation question, we distinguish the *essence problem.* Here we do not simply ask between what objects the relation obtains, but what it is between the correlated objects, by virtue of which they are correlated' (1928a, §20). Carnap described the 'essence problem' as closely connected with the concept of an 'essential relation', by which he meant, 'that which connects the members of a relation "essentially" or "really" or "actually", in contradistinction to the relation as a mere correlation which only points out the members that are so correlated' (1928a, §20). By 'essence' here, Carnap means 'essence' in Aristotle's sense, *i.e.*, the 'nature of a thing'.[21] So to answer the 'essence problem' is to specify the nature of a relation.

Later in the *Aufbau*, Carnap reflected that to ask after the essence or nature of something is to ask what it is 'in itself'. But, he continued, 'this characterises the question as belonging to metaphysics' (1928a, §161). According to Carnap, what is given is which objects are correlated by relations, not the relations themselves. Hence, Carnap concluded, statements about the nature of relations, about 'essential relations', 'cannot be brought into a

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[20]See, for example, Friedman (2007), who concentrates upon the problem of the concept of reality, which is further elaborated in Carnap's *Scheinprobleme* (1928b, §9–10).

[21]According to Aristotle, 'the essence of each thing is what it is said to be in respect of itself' (*Metaphysics* Z, 1029b14).

verifiable form'. For this reason they 'cannot be given a place in a constitutional system', hence belong to an 'extrascientific domain', *i.e.*, metaphysics. On the one hand, this refusal to admit into a constructional system statements concerning the nature of relations stands in tension with Carnap's appeal to foundedness. This is because foundedness is introduced by Carnap to characterise relations *themselves*, not merely which pairs of objects are correlated by them (1928a, §153). But, on the other hand, it shows that Carnap crossed the line into metaphysics in a sense both he and Lewis would have acknowledged, by making a claim about the *nature* of relations.

One of the principal motivations for the *Aufbau* is anti-metaphysical: to furnish a reconstruction of science free from metaphysics. But by Carnap's own lights, the *Aufbau* is undermined by his appeal to foundedness. But Lewis, we can readily imagine, welcomed this conclusion as not so far from his own view that there is no explaining how scientific theories are possible without appealing to naturalness, where naturalness is conceived as a metaphysical concept used to characterise properties and relations in themselves. Lewis was far from being misled by the occurrence of the word 'natural' in that swift passage from §154, when Carnap introduced 'foundedness' in terms of 'experienceable, "natural" relation'.

8. Goodman and Carnap on 'Grue'

In his letter to Bricker, Lewis wrote that §154 of the *Aufbau* is 'part of why I admire Carnap much more as a metaphysician than as an anti-metaphysician'. So obviously Lewis thought there were others reason for his admiring Carnap as a metaphysician. But what are they? Lewis doesn't tell us in his letter or his Behrman acceptance speech. We have to look for ourselves. I'm going to argue that Carnap's response to Goodman's puzzle about projection turns out to be a case where Carnap deviates from the

anti-metaphysical straight and narrow.[22] It is more than plausible that Lewis would have found this lapse into metaphysics admirable from the perspective of his own mature metaphysical scheme.

The most basic role of naturalness in Lewis's mature scheme is to distinguish properties whose possession makes for genuine similarity amongst its instances from gerrymandered or 'gruesome' properties that don't (1983, 345; 1986, 61). Why does Lewis call the latter 'gruesome'? Lewis is alluding, of course, to Goodman's 'grue', the predicate which Goodman famously introduced in *Fact, Fiction and Forecast* (1955) as part of his presentation of 'the New Riddle of Induction'. Let us briefly remind ourselves of the particular point Goodman made with 'grue'.

Suppose that all the n emeralds examined up to a certain time t have been green. This provides evidence for the hypothesis, h_o, that all emeralds are green. But now consider the predicate 'grue' which 'applies to all things examined before t just in case they are green but to other things just in case they are blue' (Goodman 1955, 74). The evidence provided for h_o is also evidence for the hypothesis, h_1, that all emeralds are grue—because the emeralds examined up to t have been grue as much as green. Nonetheless h_o and h_1 are incompatible if there are unexamined emeralds. Whilst we are well aware which of the two hypotheses, namely h_o, is genuinely confirmed in the envisaged scenario, both hypotheses lie in the same relation to the same evidence. So why, Goodman asked, when the relationship of h_o and h_1 to the evidence is the same, do we take 'green' to be projectible but not 'grue?' Why does the fact that emeralds are found to be green before t inspire confidence that emeralds in general are green but their being found to be grue doesn't inspire confidence that

emeralds in general are grue? Goodman's own answer was, of course, that 'green' is an 'entrenched' predicate whereas 'grue' isn't, *i.e.*, we have historically used 'green' far more than 'grue' in formulating inductions (1955, 94).

In 'New Work for a Theory of Universals', Lewis identified 'grue' as a term which does not correspond to a universal or a natural property, items whose existence and nature is fixed independently of language (1983, 345). Carnap himself made a comparable metaphysical claim during the 40s. In fact, as I'll explain, Carnap took the view that 'green' is projectible but 'grue' isn't because 'green' corresponds to a simple property whereas 'grue' doesn't. It's no accident that Carnap should turn at this point to metaphysics having already done so in the *Aufbau*—because the extension of 'grue' isn't founded, doesn't correspond to some experienceable natural property, as Carnap had used 'founded', 'experienceable' and 'natural' (1928a, §154). Its members aren't experienced by us as having something in common because some are green and others are blue, and prohibiting predicates with such extensions isn't a matter for standard logic without supplementation. Carnap, I will argue, sought to get around this shortcoming of standard logic by appealing to a metaphysics of simple properties when he applied his inductive logic—much as Carnap had appealed to the metaphysical notion of foundedness in the *Aufbau*. Of course Goodman went in a quite different direction, supplementing inductive logic with information about the past practice of using a predicate.

Goodman had first made his point about projectability in print some 9 years before the publication of *Fact, Fiction and Forecast*, in 'A Query about Confirmation' which appeared in *Journal of Philosophy*, 1946. In that earlier paper, his example of an intuitively unprojectable predicate was subtly different from 'grue' but the underlying point was the same. He imagined drawing a marble from a bowl on each of 99 days up to and including VE day, finding each marble to be red. Intuitively we expect bowls drawn from the bowl the day after VE day to be red too. But

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[22] Another case where it seems that Lewis took metaphysical inspiration from Carnap is to be found in 'Counterpart Theory and Quantified Modal Logic' (1968), where Lewis points out in a footnote that his counterpart relation is 'very like the relation of intersubjective correspondence discussed in Rudolf Carnap *Der Logische Aufbau Der Welt'* (1928a, §146; Lewis 1968, 115).

then Goodman introduced a predicate '*S*' defined as follows: 'is drawn by VE day and is red, or is drawn later and is non-red'. He reflected that the evidence speaks as much in favour of the next ball drawn after VE day being S, *i.e.*, non-red, as it speaks in favour of its being red. It's clear that we can't project both 'red' and '*S*' since that would lead us to expect that the next ball to be both red and not red. It's equally clear that we favour 'red' over '*S*', but, Goodman asked, 'how can the difference between projectible and non-projectible predicates be generally and rigorously defined?' (1946, 383).

Goodman's question was pressing and very much relevant to the contemporary scene because the year before, Carnap had begun to set out his new ideas about probability, beginning with 'On Inductive Logic', published in *Philosophy of Science*, 1945—ideas which received their fullest elaboration in his *Logical Foundations of Probability* (1950b).[23] Carnap had hitherto conceived of probability in terms of relative frequency in the long run but in the early 40s he had begun to develop a different conception of probability as a 'logical concept'. He conceived of probability in the latter sense as a relation between a hypothesis and a statement of the evidence—a relation which captures the degree of confirmation which the evidence bestows upon the hypothesis. Goodman's complaint was that Carnap's theory failed *qua* reconstruction of our inductive practices. By the lights of that theory, the hypotheses that the hundredth ball will be *S* and that it will be red are equally well confirmed by the evidence but pre-theoretically it is clear that there is no credibility to the expectation that the hundredth ball will be *S* but we do expect it to be red.

Carnap relied to Goodman in 'On an Application of Inductive Logic', published in *Philosophy and Phenomenological Research*, 1947. In that paper Carnap undertook to explain under what conditions his inductive logic, the theory based upon his logical concept of probability, can be applied to 'knowledge systems actually given or assumed' (1947, 133). He explained that before his inductive logic could be applied to a given language, it must be analysed down to a set of atomic sentences upon which a variety of conditions are imposed. His first condition, the '*Requirement of Logical Independence*', was that the atomic sentences and consequently the primitive predicates occurring in them be logically independent. His second condition Carnap dubbed the '*Requirement of Simplicity*': 'the qualities and relations designated by the primitive predicates must not be analyzable into simpler components' (1947, 136). Therefore, before his inductive logic could be applied to a language containing predicates expressing complex properties, Carnap required that the predicates in question be analysed into logical compounds of expressions standing for simple properties: 'if a property is complex, that is, analyzable in terms of properties, then it must not be chosen as primitive; it must rather be analyzed and then expressed by compound-expressions' (1947, 136). In particular the predicate '*x* occurs before or on VE day and is red, or it occurs later and is non-red', Carnap declared, 'must not be taken as primitive even if there were a simple word for it in English or any other language; it must rather be analyzed' (1947, 136).

Carnap admitted that 'the question whether a given property is simple or not often involves serious difficulties' (1947, 137). Nonetheless, Carnap felt able to offer paradigm cases. The property of being a dog is complex, he maintained, because even though we can recognise a dog without having to first identify its parts and go through a process of reasoning, we can, if pressed, analyse the property we register when we recognise one. Similar reasoning made it quite clear to Carnap that many other properties and relations are not simple either, 'this holds, for example, for "raven", "house", "milk", "occurring before or on VE day and being red, or occurring later and being non-red", and still more for "brother", "electrically charged", "schizophrenic", and the like' (1947, 137). By contrast, Carnap held, 'a certain shade

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[23]Goodman's question was also relevant to Hempel's syntactic approach to confirmation which had recently appeared in Hempel (1943, 1945).

of blue is a simple property. We cannot analyze it into simpler components' (1947, 137).

Carnap included shades of colour in the category of (1) '*purely qualitative properties*', *i.e.*, respects in which two positions in the universe may be found to differ by direct observation but can be expressed without the use of individual constants but not without primitive predicates (1947, 138). He distinguished purely qualitative properties from (2) '*purely positional predicates*' such as 'being position a_{23}' which can be expressed without using primitive predicates but use individual constants and (3) '*mixed properties*' which don't belong to either (1) or (2), such as 'being red and not being a_{28}'. On the basis of this classification Carnap imposed a third condition upon a language before his inductive logic could be applied to it, the '*Requirement of Completeness*': that every purely qualitative property or relation be expressible in it (1947, 138).

Carnap's self-admittedly 'tentative' reply to Goodman was that when his inductive logic was applied to a language meeting the aforementioned requirements, then

all purely qualitative properties . . . are inductively projectible; perhaps only these are; certainly the purely positional properties are not projectible, and I am inclined to believe that the mixed properties are not, but this requires further investigation'.

(Carnap 1947, 146)

If so, then Goodman's predicate 'occurring before or on VE day and being red, or occurring later and being non-red' isn't projectible whilst 'red' is—because the former expresses a mixed property in virtue of the occurrence of 'VE Day', the name of a position whilst the latter is expresses a purely qualitative property.

Why does 'On the Application of Inductive Logic' constitute a manifestation of the metaphysician Carnap? Because Carnap's response to Goodman relies on the supposition that there are absolutely simple properties, properties which are simple in a language transcendent sense. That's the metaphysical commitment

which Lewis either did or would have found admirable, comparable to his own metaphysical commitment to natural properties.

This may well seem to readers of Carnap's better known texts an extraordinary exegetical claim to make about Carnap, the arch anti-metaphysician. And it is true that what Carnap wrote in 1947 goes against the grain of many other of his writings. Consider, for example, the contrary point of view expressed by Carnap in 'Testability and Meaning':

It should be noticed that the term 'atomic sentence,' as here defined, is not at all understood to refer to ultimate facts. Our theory does not assume anything like ultimate facts. It is a matter of convention which predicates are taken as primitive predicates of a certain language L. (Carnap 1936, 448)

Nevertheless Carnap's view in 'On the Application of Inductive Logic' cannot have been that it is a matter of convention which predicates are to be taken as primitive before his logic can be applied, because, recall, he there ruled that the property expressed by Goodman's predicate 'occurring before or on VE day and being red, or occurring later and being non-red', 'must not be taken as primitive even if there were a simple word for it in English or any other language; it must rather be analyzed' (1947, 136). Carnap could not have ruled that the property expressed by this predicate must be analysed had he held that the only legitimate notion of simplicity is language relative—because then its complexity or simplicity would only have been relative to a language, depending upon whether there was a simple word for it, and it wouldn't have required analysis *tout court*, *i.e.*, regardless of the language in which it was expressed.

More generally, if Carnap had held that simplicity (or complexity) is only language relative, Carnap could not have maintained, as he did, that if a property is complex, 'then it must not be chosen as primitive; it must rather be analyzed and then expressed by compound expressions' (1947, 136)—because if a property's complexity were only relative to a language and there were a

language in which there was a simple word for it, then that there would be no necessity for analysis in that case.

Goodman in his reply, 'On Infirmities of Confirmation-Theory' (1947), published alongside 'On the Application of Inductive Logic', also interpreted Carnap as having made a metaphysical point against him. Goodman took the root assumption of Carnap's case to be 'that there are absolutely simple properties into which others may, and indeed for some purposes must, be analyzed' (1947, 149). But Goodman complained that he could make no sense of the absolutely simple properties which Carnap required for the application of his inductive logic,

> The nature of this simplicity is obscure to me, since the question whether or not a given property is analyzable seems to me quite as ambiguous as the question whether a given body is in motion. I regard "unanalyzability" as meaningful only with respect to a sphere of reference and a method of analysis, while Carnap seems to regard it as having an absolute meaning. (Goodman 1947, 149)

In this way Goodman took himself to play the anti-metaphysician to Carnap's metaphysician.

So far from disputing the metaphysical interpretation of his 1947 paper, Carnap confirmed this reading in his 'Reply to Nelson Goodman', which appeared in 1948. Carnap recognised that Goodman found his requirements unacceptable and that 'in particular he regards the simplicity of properties as meaningful only with respect to a sphere of reference' (1948, 461). But Carnap didn't respond by saying that Goodman's concerns were misplaced because he had only ever assumed a notion of simplicity in some language relative sense. Rather, Carnap admitted,

> I must confess that I too have a rather uneasy feeling concerning the concepts of absolute simplicity and absolute completeness referred to in the requirements. I hope very much that it will be possible to find a way of avoiding these problematic concepts and replacing them by the kind of relative concepts with which we usually work. (Carnap 1948, 461)

Carnap could hardly have been operating with relative concepts of simplicity and completeness all along if Carnap now aspired to dispense with absolute concepts in favour of relative ones.

Further corroboration of this reading of Carnap as having lapsed into metaphysics in 1947 is provided by Jeffrey, who would later work closely with Carnap on the foundations of probability and statistics. In a footnote to 'Goodman's Query' (1966), Jeffrey reflected that Carnap would surely have later withdrawn the requirement of absolutely simplicity and that 'Goodman rightly objected to this requirement in *Infirmities* (149), and Carnap expressed his qualms about it in *Reply* (461)' (Jeffrey 1966, 283 n 2). Jeffrey could hardly have thought that Carnap would later withdraw the requirement of absolute simplicity if he thought Carnap had never held it.[24] It may have been from

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[24]In his foreword to the 4th edition of Goodman's *Fact, Fiction and Forecast*, Putnam also advanced a metaphysical interpretation of Carnap's account of how to distinguish a projectible from a non-projectible predicate. Putnam ascribed to Carnap the view that over and above the way in which a predicate can be deemed disjunctive or non-disjunctive relative to a choice of primitives, predicates can be intrinsically disjunctive or non-disjunctive. Putnam took this to be absurd, 'In effect, he [Carnap] postulates a metaphysical pointer that singles out, we know not how, certain predicates as qualitative, that is, as kosher from the point of view of induction' (1983, 8). This echoes Goodman's 1947 response to Carnap (1947), although Putnam mentions neither paper. Putnam continued by remarking that Carnap's work on induction requires a further restriction of qualitative predicates to 'intrinsically fundamental ones' because the degree of confirmation relative to the evidence will depend upon whether (e.g.) 'length' or 'length squared' is taken as primitive. Putnam concluded: 'Logical Heaven itself tells us which predicates to take as primitives in our theories! These Carnapian views do not solve Goodman's Problem, they merely turn logic into metaphysics' (1983, 9). It's notable, and hardly accidental from the point of view of our present narrative, that Putnam made a similar complaint, around the same time, against Lewis's appeal to natural properties or classes to determine reference: 'Rather than solving the problem of reference, what the idea of a constraint built into nature and of elite classes does is to confuse the materialist picture by throwing in something "spooky"' (Putnam 1982, an unpublished paper for the December APA 1982 in Baltimore. I am grateful to Mario De Caro for permission to quote from this paper.). But was Putnam referring in his 1983 foreword to Carnap (1947)? Perhaps, but he

reading this footnote that Lewis was led to the metaphysician Carnap; other correspondence with Jeffrey confirms that Lewis read Jeffrey's paper, although they did not discuss the footnote (Lewis to Jeffrey, 3 February 1967, 12 March 1967).

In *Fact, Fiction and Forecast* (1955), Goodman is famous for taking issue with Carnap's 1947 paper along different lines than he did in 'On Infirmities of Confirmational Theory'. In *Fact, Fiction and Forecast*, Goodman argued, *contra* Carnap, that non-positionality or qualitativeness cannot be a criterion of projectability because 'green' and 'blue' are as positional relative to 'grue' and 'bleen' as 'grue' is relative to 'green' and 'blue'— where 'bleen' is defined as applying to things examined before a given time *t* just in case they are blue and to other things just in case they are green (1955 78–80; 1957, 532). But it is important to appreciate that making this argument, Goodman fails to keep the metaphysical character of Carnap's original proposal in focus.

To make his case in *Fact, Fiction and Forecast*, Goodman invites us to consider that 'green', for example, applies to emeralds before *t* just in case they are grue and to other emeralds just in case they are bleen. 'Thus', Goodman concluded,

> qualitativeness is an entirely relative matter . . . This relativity seems to be completely overlooked by those who contend that the qualitative character of a predicate is a criterion for its good behaviour.   (Goodman 1955, 80)

But, according to Carnap (1947), whether 'green' is qualitative is determined by whether it designates a simple property. From

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might also, or alternatively, have had in mind Carnap's posthumously published 'A Basic System of Inductive Logic, Part I' in which Carnap restricted the primitive predicates of his system to purely descriptive ones (Carnap 1971, 73–76). Whichever way, Putnam's metaphysical reading goes against Jeffrey (1966) who interpreted the later Carnap as having renounced the metaphysics of his 1947 view in favour of a semantic approach to the projectability of a predicate (1966, 286–88). For present purposes it is not necessary to adjudicate Putnam and Jeffrey's disagreement, or to decide for or against the intelligibility of intrinsically non-disjunctive predicates.

this point of view, Goodman's argument in *Fact, Fiction and Forecast* misses its target. Because what this argument establishes is only that the application conditions under which 'green' applies to something can be specified using other predicates, 'grue' and 'bleen'. But this is orthogonal to whether 'green' itself designates a simple property. So, in fact, Goodman's original criticism of Carnap, that he could make no sense of a notion of simplicity that was absolute rather than relative to context or interest, was the more telling criticism.[25]

There are two related respects in which it important to appreciate that Lewis's appeal to natural properties goes further than Carnap's 1947 assumption of simple ones. First, Carnap identified the assumption of simple properties as a necessary condition of the application of his inductive logic but provided no further support for it beyond claiming that 'the concept seems clear enough for many practical purposes', so we can tell that being a dog isn't a simple property but being blue is (1947, 137). By contrast, Lewis sought support for natural properties by showing how they were serviceable in a variety of different theoretical contexts and by mounting a full-scale Moorean defence of the distinction between natural and less-than-natural properties. So, whilst Carnap was a reluctant metaphysician, who provisionally embraced simple properties because he could presently see no alternative, Lewis got on board with the programme. Second, Lewis came to conceive of Goodman's puzzle more expansively than Carnap, not as a narrow problem about projectability but as part of a broader problem of how to extrapolate from a given set of cases to a wider one. Hence Lewis's description of Kripke's puzzle as 'formerly Goodman's challenge' (1992, 109). Kripke's puzzle concerns wherein consists the fact, say, that someone

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[25]To this extent the well-known debate between Barker and Achinstein (1960) and Goodman (1960a)—over whether there is an asymmetry Goodman missed in *Fact, Fiction and Forecast* between 'green' and 'grue' in the ways they are used which marks the former as qualitative, the latter positional—isn't a continuation of the debate between Carnap and Goodman in 1947 but orthogonal to it.

intends to perform addition rather than quaddition when they have only used the '+' sign a finite number of time—where quaddition is just like addition for small numbers but yields the number 5 if the numbers quadded exceed a certain bound (Kripke 1982, 8–9).

Lewis's response to both Kripke and Goodman was, however, the same: to appeal to 'principles of charity' that favour interpretations involving more natural functions or properties rather than less. So, Lewis wrote, 'Quaddition, being less natural and eligible, needs something positive in its favour. Addition can win by default' (1983, 376). But the fact that Lewis conceived Goodman's puzzle in this broader setting, shouldn't obscure another fact, that both Lewis and Carnap relied upon the nature of what's outside of us, the inherent naturalness or simplicity of a property, to settle the eligibility of an interpretation or projectability of a term. So even if Lewis wasn't aware of Carnap's 1947 response to Goodman, he had every reason to admire the metaphysician Carnap revealed there, albeit a lapsed anti-metaphysician soon to return to the straight and narrow as the author of 'Empiricism, Semantics, and Ontology' (1950a).

9. Conclusion

Recall the passage from Lewis's acceptance speech for the Behrman Prize that set us on our course:

> I suppose my historical ancestors are above all, Leibniz and Hume... And more recently Mill, Ramsey, the metaphysician Carnap (not to be confused with the anti-metaphysician Carnap, who is better known), and Quine.

It's by now quite clear that Lewis's counting the metaphysician Carnap as one of his historical ancestors wasn't an extraordinary claim for him to make but a perceptive one. Lewis put his own distinctive slant upon the idea that a metaphysics of natural properties had an indispensable role to perform in the under-

standing of thought and language but the idea had already been anticipated and seriously taken up by Carnap in the *Aufbau* and again in his 1947 response to Goodman's puzzle about confirmation.

When undertaking the study of the history of philosophy it's sometimes useful to draw a stricter distinction which we may put in terms of a distinction between questions of ancestry and questions of influence—meaning by the former questions about the relations of ideas themselves but by the latter questions about whether, for example, one historical figure adopted a given position because they'd read another.[26] In these terms, I've argued that Lewis was right to conceive of the metaphysician Carnap as one of his ancestors in this stricter sense but was he one of Lewis's influences?

The context in which Lewis described his historical ancestry (in his acceptance speech) is one in which he had been explaining to his audience that despite the fact that philosophy is continually rocked by unwelcome and unnecessary revolutions, 'I think there is a cumulative growth of knowledge in philosophy'. He went on to explain that progress in philosophy is a collective achievement, 'if philosophy is the growth of knowledge about a genuine subject matter, then nobody can accomplish much single-handed. Then in honoring my accomplishments, you are in fact honoring the joint work of many hands, past and present'. Since Lewis conceived of his own accomplishments as the 'joint work of many hands', including the metaphysician Carnap, he would have either rejected the distinction between philosophical ancestor and influencer as ultimately untenable in the kind of intellectual community we historically inhabit or held that the metaphysician Carnap did after all influence him.

This makes it even more striking that Lewis didn't acknowledge the influence of the metaphysician Carnap in his published

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[26]So conceived, questions of ancestry belong to what Bergmann called 'structural history', which, he held, occupies a philosophical Goldilocks zone between logical analysis and historical scholarship (1956, 175).

writings. His mention is conspicuously absent from 'New Work for a Theory of Universals', the paper which marked the advent of Lewis's mature metaphysics. Lewis did credit Gary Merrill there with the suggestion that 'an objective structure of properties and relations in the world' is required for the possibility of determinate thought (1983, 370). Lewis wrote to Putnam, 'The idea is due to Gary Merrill; I took care to give him due acknowledgment, and I'd be much distressed if the idea gets associated with my name to the exclusion of his' (Lewis to Putnam, 3 January 1983).[27] And when the paper was reprinted in his *Papers in Metaphysics and Epistemology* (1999), Lewis added a footnote crediting 'discussion and correspondence with D. M. Armstrong over several years' with having made Lewis realise the need for theory of properties that is more than just set theory applied to possibilia (1999, 8). But whilst Lewis mentioned Merrill and Armstrong as having influenced his metaphysical views, Carnap isn't mentioned. *Prima facie* Carnap, in this respect, was an ancestor of Lewis although not an influencer in the strict sense.

Our discussion of the early Lewis has, however, thrown up evidence that suggests the metaphysician Carnap did play a more direct role in Lewis's formative development. When Lewis recollected that it was primarily Armstrong that persuaded him of the serviceable nature of the distinction between natural and less than natural properties Lewis appears to have forgotten that years before Armstrong had converted him, Lewis himself had seriously engaged with a cognate distinction. In 'Policing the *Aufbau*' (1969) Lewis had drawn the distinction between 'gen-

uine' and 'spurious' similarity, a distinction between a founded and an unfounded relation, when defending Carnap's *Aufbau* reconstruction of ordinary quality talk. Perhaps the metaphysician Carnap influenced Lewis after all, when Lewis was steeped in the text of the *Aufbau*, sowing an idea that proved fruitful for Lewis decades later.

Acknowledgements

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[27]In 1978 Gary Merrill sent Lewis a draft of his paper 'The Model-Theoretic Argument Against Realism' in which he sought to undermine Putnam's model-theoretic argument by distinguishing genuine relations from relations with miscellaneous extensions (Merrill 1980, 72). Lewis wrote back, 'I like your reply to Putnam', praising Merrill's 'requirement that the predicates be interpreted by genuine relations' (Lewis to Merrill, 11 October 1978). See Janssen-Lauret and MacBride (2020a, 195–97) for further discussion of how Lewis welcomed and incorporated Merrill's suggestion into his system.

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